No. 23-1351

UNITED STATES COURT OF APPEALS FOR THE FOURTH CIRCUIT

MARYLAND SHALL ISSUE, INC.; FIELD TRADERS, LLC; CINDY'S HOT SHOTS, INC.; PASADENA ARMS, LLC; WORTH-A-SHOT, INC.

Plaintiffs-Appellants,

v.

ANNE ARUNDEL COUNTY, MARYLAND,

Defendant-Appellee.

On Appeal from the United States District Court for the District of Maryland at Baltimore, Case No. 1:22-cv-00865-SAG, Hon. Stephanie A. Gallagher

BRIEF OF AMICUS CURIAE MATTHEW MILLER AND DEBORAH AZRAEL IN SUPPORT OF DEFENDANT-APPELLEE AND AFFIRMANCE

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STATEMENT OF IDENTITY AND INTEREST[1]

Dr. Matthew Miller, MD, ScD is Professor of Health Sciences and Epidemiology at Northeastern University where he teaches, among other subjects, courses on research methods and epidemiology. Dr. Miller is also Adjunct Professor of Epidemiology at the Harvard T.H. Chan School of Public Health, and Co-Director of the Harvard Injury Control Research Center. He received his undergraduate and medical degrees from Yale University and his Doctor of Science degree in Health Policy and Management from the Harvard School of Public Health.

Dr. Miller is an expert in injury and violence prevention. He has published extensively in this field, including over 200 articles published in peer-reviewed publications. His research encompasses intentional and unintentional injury, with an emphasis on firearm related violence and suicide prevention. Dr. Miller is a recipient of the Excellence in Science Award from the American Public Health Association and Reviewer of the Year award from the American Journal of Public Health.

Dr. Deborah Azrael, PhD is Director of Research of the Harvard Injury Control Research Center (HICRC). She received her PhD in Health Policy, with a

[1] No party's counsel authored this brief in part or in whole. No party or party's counsel contributed money to fund preparing or submitting this brief. No person other than the *amici curiae* or their counsel contributed money that was intended to fund preparing or submitting this brief. All parties consented to the filing of this brief.

concentration in Statistics and Evaluative Sciences from Harvard University. Much of Dr. Azrael's scholarship, especially over the past decade, has focused on studies designed to inform interventions to reduce suicide.

Dr. Azrael has over 25 years' experience conducting and leading grant-funded research on firearm violence, injury surveillance and suicide prevention. She was the co-director of the pilot for what became the National Violent Death Reporting System, a 50-state surveillance system that collects data on all homicides, suicides, and unintentional firearm deaths. Dr. Azrael has also designed and analyzed surveys of adults in the United States about gun related behaviors and beliefs and has written dozens of articles in peer-reviewed social science journals exploring the relationship between access to firearms and suicide, and about the ways in which firearm owners store their guns. In 2015, she was named one of the ten Americans who shaped the gun debate by The Trace.

INTRODUCTION AND SUMMARY OF ARGUMENT

One of the issues in this case is whether Anne Arundel County made a factually accurate statement when it said access to lethal means like firearms is a risk factor for suicide. Based on Dr. Miller's and Dr. Azrael's decades of experience in the fields of injury, suicide, and violence prevention, they conclude that the answer to that question is an unequivocal "yes". High quality studies published in the peer-reviewed literature, by researchers from different disciplines (e.g.,

epidemiologists, biostatisticians, economists, clinicians), across more than four decades and drawing research subjects from different populations (e.g., adults, adolescents, males, females), overwhelmingly find that access to firearms increases suicide risk. Indeed, no credible study finds otherwise.

Dr. Miller and Dr. Azrael submit this brief to provide this Court with an overview of this research, which strongly supports the defendant-Appellees' decision to notify gun and ammunition purchasers that firearm access is a risk factor for suicide.

ARGUMENT

I. EVIDENCE THAT ACCESS TO FIREARMS IS A RISK FACTOR FOR SUICIDE IS OVERWHELMING

In 2021, the most recent year for which data are available, 48,183 people, or approximately 130 people per day, died by suicide in the United States. Ctrs. For Disease Control & Prevention, *Underlying Cause of Death, 2018-2021, Single Race*.[2] Of these, more than half (55%) used a firearm. *Id.* As has been the case for the past several years, United States suicide mortality in 2021 outstripped other leading causes of mortality such as motor vehicle crashes (45,404 deaths), influenza

[2] https://wonder.cdc.gov/controller/datarequest/D158;jsessionid=B2D54967E0EFF177287C7766311F (last accessed July 14, 2023).

and pneumonias (41,917 deaths), and homicide (26,031 deaths, of which 20,958 were committed with a firearm). *Id.*

The conclusion that living in a home with firearms is a risk factor for dying by suicide draws on results from dozens of high-quality, peer-reviewed studies published in medical and social science journals. These studies show that access to household firearms is a risk factor for suicide not only for the gunowner, but also for other members of the household who do not own guns (e.g., the non-gun owning spouse and children of a gunowner). These studies were conducted by different investigators using different methodologies over different time periods and reached comparable results.

A. Population-Level Studies Strongly Support the Conclusion that the Presence of Guns is a Risk Factor for Suicide

Firearm suicide rates and overall suicide rates in the United States are substantially higher in parts of the country where guns are more prevalent. JA1476-JA1486. By contrast, rates of suicide by methods other than firearms are similar across states regardless of the prevalence of guns. *Id.* Data supporting this conclusion come from a broad range of studies that have sought to explain why rates of suicide vary fourfold across states (e.g. in 2020, from 7.6 per 100,000 in New Jersey to 31.3 per 100,000 in Wyoming). Ctrs. for Disease Control & Prevention, *supra*. Notably, not only have these studies consistently found that firearm suicide and overall suicide rates are associated with firearm ownership levels, they have also found that

variation in suicide rates across states is not attributable to differences in rates of suicide attempts, major depression, serious suicidal thoughts, serious mental illness, alcohol and drug dependence and abuse, urbanization, poverty, or unemployment. JA1462-1469; JA1448-1455; David Hemenway and Matthew M. Miller, *Association of rates of household handgun ownership, lifetime major depression, and serious suicidal thoughts with rates of suicide across US census regions*, 8 Injury Prevention 313 (2002); JA1476-1486.

The table below, from *Firearms and suicide in the United States: Is risk independent of underlying suicidal behavior?* (the "Miller Study"), provides an illustration of these findings. JA1476-1486. Specifically, the table shows that while the number of *nonfirearm* suicides is similar in high-gun ownership states and low-gun ownership states, the number of *firearm* suicides, and thus total suicides, are starkly different.

Table 3. Suicides and Suicide Attempts in US States with the Highest and Lowest Gun Ownership Levels, 2008–2009

Population Group by State Gun Ownership Level	Person-Years	No. of Firearm Suicides	No. of Nonfirearm Suicides	Total No. of Suicides	Population With Suicidal Acts,[e] %	95% CI
High–gun ownership states[a,b]						
All adults	62,383,037	7,275	4,153	11,428	0.41	0.18, 0.63
Adult men	30,273,657	6,263	2,905	9,168	0.38	0.16, 0.60
Adult women	32,109,380	1,012	1,248	2,260	0.44	0.17, 0.71
Adults aged 18–29 years	13,829,694	1,303	960	2,263	1.04	0.40, 1.67
Adults aged ≥30 years	48,553,343	5,972	3,193	9,165	0.24	0.09, 0.38
Low–gun ownership states[c,d]						
All adults	62,447,876	1,697	4,341	6,038	0.49	0.00, 0.98
Adult men	29,810,942	1,572	3,207	4,779	0.38	–0.04, 0.79
Adult women	32,636,934	125	1,134	1,259	0.60	–0.01, 1.21
Adults aged 18–29 years	13,335,648	219	778	997	0.97	–0.01, 1.94
Adults aged ≥30 years	49,112,228	1,478	3,563	5,041	0.26	–0.06, 0.58

Abbreviation: CI, confidence interval.
[a] High–gun ownership states are Alabama, Alaska, Arkansas, Idaho, Iowa, Kentucky, Louisiana, Mississippi, Montana, Nebraska, North Dakota, Oklahoma, South Dakota, Tennessee, West Virginia, and Wyoming.
[b] In high–gun ownership states, 51% of adults live in households with firearms.
[c] Low–gun ownership states are Connecticut, Hawaii, Massachusetts, New Jersey, New York, and Rhode Island.
[d] In low–gun ownership states, 15% of adults live in households with firearms.
[e] The percent of the population that engaged in fatal and nonfatal suicidal acts over the past year.

JA1482. The Miller Study used data from a 200,000-person survey conducted by the CDC in 2004 to determine gun ownership levels across the 50 states. *Id.* In the table above, high gun ownership and low gun ownership states are grouped so that the total population in each group (high and low) is approximately equivalent. This allowed the authors to present data using the numbers of suicides that occurred in those two sets of states.

The study found that the number (and therefore the rate) of nonfirearm suicides and the proportion of people who reported having made a suicide attempt were comparable between the high-gun ownership and low-gun ownership states. However, over the two-year study period, almost twice as many adults (11,428) died by suicide by any method in the high-gun ownership states than in the low-gun

ownership states (6,038). *Id.* That difference in total suicides is almost entirely attributable to the greater number of firearm suicides, which were more than four times more common in the high-gun ownership states (7,275 vs. 1,697). There was virtually no difference in the number of non-firearm suicides (4,153 vs. 4,341) or the proportion of people who attempted suicide (0.41% in the high-gun ownership states verses 0.49% in the low-gun ownership states). *Id.* As depicted in the table, firearm and overall suicide rates are higher in places with more guns than in places with fewer guns across all the demographic segments of the population examined: adult men, adult women, adults aged 18-29, and adults aged 30 and older. *Id*.

B. Studies Using Individual-Level Data Show the Presence of Guns is a Risk Factor for Suicide

The evidence that guns are a risk factor for suicide does not rest solely on evidence from population-level studies. The strongest evidence comes from case control and cohort studies – individual-level studies that examine whether people with access to firearms (e.g., gunowners, non-gunowners who live in the same household) are more likely to die by suicide.

1. Case Control Studies

In case control studies, researchers first identify "cases" – people with the outcome they want to learn more about, such as suicide – and a comparison group of people without that outcome, "controls", such as people living in the same community as the cases. Researchers then assess whether the exposure of interest (in

this case access to firearms) is different among cases as compared to controls. This comparison allows researchers to draw conclusions about the association between exposure and outcome (in this case firearms and suicide). This approach is an efficient design for studying outcomes that are relatively rare, like suicide.

As summarized by Dr. Andrew Anglemyer and his colleagues in *The Accessibility of Firearms and Risk of Suicide and Homicide Victimization Among Household Members*, JA1180-1193, there have been over a dozen case control studies in the United States, all of which have found that the presence of a gun in the home is a significant risk factor for suicide. *Id.* The paper by Dr. Anglemyer and his colleagues is the largest meta-analysis on the topic to date. It pooled and analyzed data from across case control studies and concluded that, overall, having a gun in the home increases the risk of suicide by more than threefold. JA1185.

Looking at the individual studies included in this meta-analysis highlights the consistency of findings across these studies. For example, the finding that access to a firearm is a risk factor for suicide holds across demographic groups, including adults,[3] adolescents,[4] older adults (JA1254-1265), males and females (JA1364-1372;

[3] JA1254-1265; JA1284-1289; Linda L. Dahlberg, et al., *Guns in the home and risk of a violent death in the home: findings from a national study*, 160 Am. J. Epidemiology 929 (2004); JA1296-1304; JA1322-1328; JA1591-1603.

[4] JA1218-1225; JA1201-1209; JA1210-1217; JA1226-1232; JA1233-1243; David A. Brent, et al., *Age- and sex-related risk factors for adolescent suicide*, 38 J. Am. Acad. Child Adolescent Psychiatry 1497 (1999).

JA1194-1200), and Caucasians and African Americans (JA1373-1381). Firearm access is also shown to be a risk factor for suicide when firearm accessibility information was provided by proxies,[5] or determined from firearm purchase records (JA1284-1289; JA1290-1295).

The same finding emerges regardless of what control participants were used. Examples of such control groups for studies of adults include members of the community from which the suicide deaths came (JA1322-1328; JA1364-1372; JA1254-1265), decedents from causes other than suicide (JA1364-1372; JA1373-1381; JA1290-1295), participants in a national health survey (JA1591-1603), and members of the same health care plan as the suicide decedents (JA1284-1289). Control groups among adolescents included psychiatrically ill suicide attempters (JA1201-1209), never-suicidal psychiatric adolescents (JA1210-1217), adolescents in the community with a lifetime history of mood disorders (JA1233-1243), and a general sample of adolescents in the communities that gave rise to the suicide decedents (JA1476-1486).

[5] *See supra*, Brent et al., (2013); JA1322-1328; JA1591-1603; JA1201-1209; JA1210-1217; JA1364-1372; JA1373-1381; JA1254-1265; JA1284-1289; Dahlberg et al., 160 Am. J. Epidemiology 929; JA1290-1295. Because proxies, those who knew the descendent, have to be used to determine whether someone who died by suicide had access to a firearm, proxies were also asked about the control group's access to firearms.

For example, in *Firearms and Adolescent Suicide* by Dr. David Brent and his colleagues, JA1226-1232, selected adolescent controls from communities similar to those in which the suicide decedents had lived. The adolescent suicide victims were over four times more likely to have lived in homes with firearms, compared to the living controls, even after adjusting for differences in underlying suicide risk factors between cases (suicides) and controls. JA1223-1224.

2. Cohort Studies

Cohort studies have also consistently found that firearm access is a risk factor for suicide. Cohort studies divide people into groups depending on whether they share a given exposure (e.g., do they own handguns, do they smoke) and examine what happens to them over time. In cohort studies using observational data, the investigator follows a group over time and various types of outcomes are observed among cohort members for whom a given exposure is known. Here that exposure is the purchase of a gun, and thus direct comparisons can be made between cohort members who did – and did not – purchase guns.

These studies, as with case control studies, can adjust for measured characteristics that may differ across exposure groups (e.g., sex, age, race). Also like the case control studies, cohort studies that have analyzed the potential relationship between guns and suicide have consistently found that a gun in the home is a risk factor for suicide, both for the gunowner and for other members of the household.

A recent study, *Handgun Ownership and Suicide in California*, published in the New England Journal of Medicine in 2020, is the largest study conducted to date to examine the gun-suicide relationship. JA1569-1579. The study compiled information on 26 million Californians over 12 years, tracked first-time handgun acquisitions, and then compared the frequency of suicide death overall and by method among those who did and did not acquire a handgun. JA1571, JA1573. In this study, handgun owners were nearly four times as likely to die by suicide compared with people without guns, even when controlling for gender, age, race, and neighborhood. JA1574. The elevated suicide rate among handgun owners was driven by their higher rates of suicide by firearm — eight times higher for men and 35 times higher for women, compared with non-owners of the same age and gender. *Id.* By contrast, handgun owners did not have higher rates of suicide from other methods or higher rates of death by other causes. *Id.*

That study also found that the risk of suicide was elevated not only immediately after the handgun purchase but throughout the entire 12-year study period.[6] JA1574-1576. According to the study, the period of greatest suicide risk for first-time handgun owners was the initial few weeks of ownership, when it soared to

[6] This conclusion is consistent with results from a case-control study in which the relative risk for suicide given a family handgun purchase was greatest within the first year after purchase, but remained elevated throughout the 5-year study period. JA1284-1289.

100 times the risk for non-owners. *Id.* However, 85 percent of all gun suicides among owners occurred more than a month after purchase, and more than half occurred more than a year later. *Id.* These findings suggest that while some people who die by gun suicide buy their weapons intending to kill themselves, most purchase the gun long before they kill themselves. Their deaths reflect the substantial and enduring risk of suicide posed by access to handguns.

A second cohort study using the same California dataset asked about second-hand risk: how is a woman's risk of dying by suicide affected when an adult she lives with decides to become a lawful handgun owner? JA1501-1508. The study tracked nine million non-gun owning women over the 12-year study period. The investigators found that the suicide mortality rate among women living with someone who acquired a handgun during the study period was more than 40% higher than the suicide mortality rate for women who continued to live in gun-free homes. JA1505. This study, along with all case-control studies among children, further bolsters the conclusion that it is the presence of the gun, rather than the desire to purchase a gun that increases risk of suicide.

II. IT'S THE GUN, NOT THE GUNOWNER

The magnitude and consistency of evidence linking firearm availability in the United States and suicide demonstrate without exception that a gun in the home is a risk factor for suicide for all members of the household. No other factor has been

identified that can explain these findings. Several studies over the past 20 years have found that people in homes with firearms are neither more likely nor less likely to have risk factors for suicide (other than the gun in their home) compared with people in homes without firearms.[7]

For example, studies using the National Comorbidity Survey Replication, a nationally representative study of adults that includes questions about household firearm ownership and psychiatric disorders, have found that adults with psychiatric disorders such as depression, generalized anxiety disorder, and substance use disorders are as likely to live in a home with a gun as in a home without one (whether examined individually, grouped by disorder type, or considered as a whole). Ilgen et al., *supra* 59 Psychiatric Servs. 198; JA1462-1469. Another analysis using a nationally representative sample of adolescents produced similar findings. Simonetti et al., *supra* 72 J. Am. Med. Ass'n Psychiatry 152. That study found that adolescents

[7] Marian E. Betz, et al., *Suicidal behavior and firearm access: results from the second injury control and risk survey*, 41 Suicide Life Threat Behavior 384 (2011); Mark A. Ilgen, et al. *Mental illness, previous suicidality, and access to guns in the United States*, 59 Psychiatric Servs. 198 (2008); JA1462-1469; Susan B. Sorenson, et al., *Mental health and firearms in community-based surveys: implications for suicide prevention*, 32 Eval Rev. 239 (2008); Joseph A. Simonetti, et al., *Psychiatric comorbidity, suicidality, and in-home firearm access among a nationally representative sample of adolescents*, 72 J. Am. Med. Ass'n Psychiatry 152 (2015); David W. Oslin, et al., *Managing suicide risk in late life: access to firearms as a public health risk*, 12 Am. J. Geriatric Psychiatry 30 (2004).

with a history of mental illness and/or suicidality were no more or less likely to report in-home firearm access as those without such histories.

Even when studies have found that a suicide risk factor (other than firearms) is more prevalent in homes with firearms as compared to homes without firearms the magnitude of the difference has been minimal. Importantly, the small magnitude of the difference is far too small to explain the greater than threefold risk of dying by suicide posed by living in a home with guns. JA1492-1500; Sonja A. Swanson, et al., *Firearm access and adolescent suicide risk: Toward a clearer understanding of effect size*, 27 Injury Prevention 264 (2021). In short, it is the presence of the gun, not anything about the gunowner, that increases the risk of suicide.

CONCLUSION

Taken as a whole, this body of research, which includes population-level, case-control, and cohort studies, along with bias analyses, unequivocally establishes that access to firearms is a risk factor for suicide. This substantial risk pertains not only to the gunowner but to *all* household members.

Dated: July 17, 2023

Respectfully submitted,

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CERTIFICATE OF COMPLIANCE

This brief complies with the type-volume limitation of Fed. R. App. 29(a)(5) and 32(a)(7)(B) because it contains 3,062 words, excluding the portions of the brief exempted by Fed. R. App. P. 32(f).

This brief complies with the typeface requirements of Fed. R. App. 32(a)(5) and the type-style requirements of Fed. R. App. 32(a)(6) because this brief has been prepared in a proportionally spaced typeface using Microsoft Office Word 2022 in 14-point Times New Roman font.

Dated: July 17, 2023

/s/ Bradley S. Lui
Bradley S. Lui

CERTIFICATE OF SERVICE

I hereby certify that I electronically filed the foregoing with the Clerk of the Court for the United States Court of Appeals for the Fourth Circuit by using the CM/ECF system on July 17, 2023.

I certify that all participants in the case are registered CM/ECF users and that service will be accomplished by the CM/ECF system.

Dated: July 17, 2023

/s/ Bradley S. Lui
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